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ABSTRACT

The relationship between decisions to change course content and resulting changes in teaching methods, students' performance assessment, departmental size and organization, and staff-student ratios is examined. Detailed discussions are provided on: Communication of course aims to staff and students, design of courses in which teaching methods and assessment assist realization of aims, and some reorganization of staff activities and use of resources such as teaching space. Recommendations are provided for organizing postgraduate supervision and studies. (Author/SPG)

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COURSE DESIGN, TEACHING METHODS AND DEPARTMENTAL DECISIONS

Almost everyone realises that content of courses in higher education must change with developments in his subject, but it is by no means generally appreciated that decisions to change content often imply changes in methods of teaching and of assessment of students' performance. If these are not made, a number of characteristic malaises may follow in the department. In addition, changes in departmental size or in staff-student ratios, replacement of lectures by group discussion, or modification in course content, may require decisions relating to departmental organisation if problems are to be avoided. Broadly speaking, these decisions relate to: communication of course aims to staff and students, design of courses in which teaching methods and assessment assist realisation of aims, some reorganisation of staff activities and use of resources - such as teaching space.

1. Communication of Course Aims

Where new courses have been devised ab initio as at the Open University, or in setting up modular courses in the Polytechnics, implications for decision making have perforce been recognised. Aims and implications of the new approaches are clearly spelled out to enable both teachers and students to understand their roles in the new scheme, and so to enter the new courses with appropriate attitudes and expectations.

Wherever courses are fundamentally replanned by groups of teachers, questions from colleagues oblige teachers to spell out aims more explicitly and to consider findings relating to course construction, or the effects of teaching methods and various ways of assessing achievement. They learn - perhaps for the first time - what colleagues in other departments are teaching, and may question its contribution to higher education as they conceive it. During discussion in one Polytechnic in London, where modular courses were being planned, teachers of

arts challenged those of mathematics and physics to show that they did anything more than train students in skills and techniques required in working 'exercises'. They were unable to see these disciplines as developing higher modes of thinking or as broadly educational. Thus a valuable discussion was initiated, leading to better understanding by both kinds of specialists of the disciplines and views of the others, and to clearer exposition by each of their aims in teaching.

There is a tendency in well established departments to assume that aims are apparent to both colleagues and students. Nevertheless, a few examples serve to show that there may be a failure in communication which results in problems for students and disappointment for their teachers unless action is taken promptly.

In a London medical school, clinical students complained that they did not know how they should employ their time and, in particular, what to read. They felt that they were expected to learn all the information in the substantial text books; a few of them having excellent memories, set out to do this. The clinical teachers were surprised when informed what their students were doing by colleagues from another department, saying that they did not require students to learn a great deal of information but expected them to concentrate on skills in diagnosis, treatment, prognosis and patient management. Surprisingly, it had not occurred to them that they should make these requirements explicit. Indeed it seems customary in clinical departments to deplore the tendency of students to absorb information and to blame this on their experience of pre-clinical studies. In this instance, however, half the students were already graduates who, on their part, deplored the supposed expectations of clinical teachers that they should spend much of their time memorising information. A decision to prepare a pamphlet or booklet explaining aims and methods in clinical teaching could have avoided this.

Thus at the Open University, a failure in communication due to preconceptions of students was averted when books of the Foundation Course in Science were first circulated. Some intending students, perplexed by the sections on

objectives, wrote to the teachers inquiring what they should learn. Evidently, they thought of science as a subject to be learned from books rather than as a method to explore the universe or some aspect of it. Because aims had already been stated a discussion was initiated which ensured that these students began the course with expectations appropriate to intending scientists.

No doubt many university teachers introduce courses by explaining and discussing their purposes; but it is by no means uncommon to meet intelligent students who have not been told - or have not comprehended - their teachers' aims, even after several terms' work in their departments. Some of them question whether the teachers know their aims themselves! This is, perhaps, most likely to happen where teachers have made modifications in course content without considering their implications within the course as a whole, or where members of teaching staff are committed to different interpretations of their subject. In the latter case, students may find themselves assailed by different vocabularies and concepts, or worse, by identical vocabulary having different connotations according to point of view, although they have never had differences in interpretation explained to them. Beginners who have not realised that there are several viewpoints, are thus exposed to an almost insoluble - and wholly unnecessary problem.

Findings from inquiries and researches, although not numerous, confirm observations that students fare better if they know what are the purposes of the courses they attend and what tney will be expected to achieve at different stages in them (where this seems relevant) (Piper, 1967). Indeed, a clear exposition of what a course entails may allow students to study independently in their own way and at a pace to suit themselves. At Aarhus, in Denmark, the aims of a course in physiology have been spelled out in detail, requiring students from the beginning to learn applications of information (Naeraa, 1972). This is not compulsory reading, since the course is also offered at two levels, using texts which cover it in main outline and in greater detail. Students can choose to work alone or

in a class. If alone, they may work in any way they please using the objectives as a guide, or following a text; if they prefer a class, well prepared students may opt for the more difficult course only, whilst the less well prepared pursue the courses in succession. Students may therefore choose to present themselves for examination at the end of one session or two. Thus the initial work by the teachers in spelling out objectives has served to give flexibility to the course, in addition to informing all staff and students as to its nature.

A bogey sometimes conjured up by those temperamentally opposed to analysis of aims and objectives (or, perhaps, by teachers of arts subjects in which the task is more difficult) is that these are likely to lead to inflexibility since teachers will be unwilling to give the time needed to revise them. Evidence suggests, however, that since teachers do not readily agree in the first place as to what aims should be (Walton & Drewery, 1966), there tends to be continuous pressure to modify any scheme in various ways. When alternative courses are provided, as at Aarhus, there is, in addition, opportunity for original approaches in teaching and learning which are likely to lead to further modifications of the original scheme.

2. Course Design and Assessment

A second problem, of which students are commonly more aware than are their teachers, is that teaching methods and examinations may convey a different message from the teachers' stated aims. There are courses in which students are told they must show initiative but find that the teachers make all the decisions. More commonly, systems of assessment encourage an emphasis by students on gathering and remembering information, despite their teachers' claim that a chief aim of the course is that the students should learn to think. It is quite common to

hear teachers deploring that their students seem to be concerned solely with passing examinations. They do not consider the possibility that the system of assessment rewards acquisition of information whilst giving little credit for skill in thinking, wide interests, or capacity for originality.

It is time that in countries which accept a large proportion of the population into universities - and, to a lesser extent, in Britain - students arrive with different expectations of their courses. Studies show fairly distinct orientations, for instance, vocational, academic, social or non-conforming (Dufty, 1973); but it would be wrong to conclude that the first and third of these groups - or even the forth - are necessarily uninterested in studying a subject in depth for its own sake. On the contrary, evidence suggests that such interest may be fostered or reinforced by the course, the influence of teachers, stimulating teaching methods and appropriate methods of assessment.

Fairly recent studies of examinations in physics (Black, 1968), chemistry and biochemistry (Beard & Pole, 1971) show that they tended to encourage acquisition of information rather than higher levels of thinking. Following his investigation into physics finals papers, Black commented that over forty per cent of questions could be answered entirely from memory, that papers were of a common pattern which enabled candidates to gain high marks through a well organised memory, and that questions were neither systematic nor searching. It is of interest that in departments which have now instituted open-ended, challenging, experimental work in the laboratory and a research project demanding study in depth of a topic of the student's choice (which both count to the final assessment) most students are far more enthusiastic than formerly. Significantly, Black and his colleagues quote students as saying: "I hated the cramming for finals and felt I knew nothing. I very much enjoyed group students and felt I was really sorting something out and learning things", and: "They (the group projects) are the only way in which originality could creep into our undergraduate life -

without them our course is like a machine taking in students, filling them with information which they pour out in examinations and forget soon after." (Black, Dyson & O'Connor, 1968)

In the inquiry into biochemistry examinations teachers were invited to assess the level at which each question on their 1968 examinations papers could be answered, using a taxonomy of educational objectives prepared by McGuire (1963). This identifies eight intellectual levels at which a question may be answered:

1. recall of specific facts
2. recognition of meaning or implication
3. selection of appropriate generalisations to explain phenomena
4. interpretation of data presented in a variety of forms
5. application of principles to solution of problems of a familiar type
6. analysis of unfamiliar constellations of events
7. evaluation of a total situation
8. synthesis of data into new and meaningful wholes

Typically questions which can be answered only at level 1 require students to describe ..., to outline, to draw a diagram, to write brief notes, and so on. There is little scope for displaying understanding and none for originality.

Questions requiring answers at level 2 are likely to remind students of some finding and to ask what are its implications. This requires little thinking if the question, or something very similar, has already been discussed in class. At the third level, questions are of the type Why is ... true? or How do you explain ...? Level 4 involves translation of verbal, tabular, morphological or graphic data into another form. (This is an activity which normally receives practice in laboratory work.) At level 5 items contain new content, but involve a familiar kind of problem solving. Items at level 6 require the student to recognise the constituent elements and relationships in a set of data, to judge their internal consistency, and to comprehend the organisational principles involved. At level 7 the student is presented with data, or a theory together

with evidence, which he is required to evaluate. Finally, items at level 8 give the student opportunity to develop an original (to him) theory explaining phenomena. This involves arranging and combining concepts and principles to form a pattern or structure not clearly there before.

In discussion of these papers with teachers of biochemistry, we found that, although essay questions can usually be answered at more than one level, over a third of all their ratings were at level 1, whilst about a quarter were at level 2. Some of the ten schools which participated had few items at other levels, nor did they set a project, or other activity, requiring students to display capacity to think at the higher levels. An inevitable corollary was that this capacity was not exercised or improved as a consequence of such courses.

Even if papers had been devised which tested thinking at all levels, important objectives would have been neglected. As an illustration of a general kind, the following objectives, with corresponding teaching methods and form of evaluation, were produced for discussion at an introductory course for lecturers:

Table 1: Objectives in University Education (for consideration and comment)

Objectives -	Teaching method or student activity	Evaluation or feedback
1 KNOWLEDGE		
At the end of a university career, a student should:		
know the basic terminology of his subject	lectures; assigned reading; practicals; demonstrations, etc	multiple-choice-question examinations; correct use of terms in essays, discussion, etc
know the principles (basic laws and concepts) of his subject	lectures; assigned reading; practicals; demonstrations, etc	correct reference to laws etc in arguments; essay writing etc
understand some of the uses to which his subject is put	contact with research, industry, professionals in own field; experiments, projects, where appropriate	informative assessment of project essays etc
be acquainted with principles and applications of related subjects	general studies; background reading	synthesis of data from various sources
2 SKILLS		
University teaching in general should enable the student:		
to write coherently	essays; laboratory reports; dissertations; papers to be given in tutorials	informative assessment of these
to be verbally articulate	giving papers; effective argument in discussion groups; tutorials etc	criticism by other students and tutors
to make his own independent judgements	meets contradictions; contrasting points of view; use of discussion to expose student's assumptions etc	eg 'compare and contrast' questions in examinations; evaluation of arguments etc

Table 1 (Cont)

Objectives	Teaching method or student activity	Evaluation or feedback
to obtain information efficiently	use of library, abstracts etc; preparation for essays, projects; open-ended experiments	informative comment on performance; open-book examinations
to think creatively, imaginatively and in abstract terms	research projects; tackling unsolved problems; use of concepts in arguments, discussion	quality of writing (publications?); assessment of method in tackling problems; credit for originality
to cooperate with colleagues and other professionals in future career	joint projects; role playing; group discussion to give insight into group interactions	evaluation of student's behaviour in a group by tutors and other students
to develop adaptability, ie to cope with changing patterns of knowledge (both general technological advance and new ideas in own subject)	exposure to new ideas (not accepting everything given as 'facts')	follow up after graduation
3 ATTITUDES		
An aim in university teaching is to foster in the student:		
enthusiasm for learning	nonassigned reading; extracurricular meetings (eg science clubs)	extent of extracurricular activity; posing new problems for own investigation
scholarly concern for accuracy	contact with teachers and researchers displaying such accuracy; continuous checking of own results	assign marks for accuracy in examinations
awareness of moral, social, economic, political and scientific problems of society	general studies; some projects; modern history, literature, sociology	impressionistically, from student's writing and discussion

3. Course Design and Individual Teaching

A third problem, arising mainly from the size of many modern departments, is that teachers do not have time to assist students individually with their various deficiencies or to repeat the same explanation to each student who fails to comprehend a point. One solution is to make use of modern techniques for individual, guided study, such as programmed texts of various kinds and tape-slide sequences possibly accompanied by books and tests or other illustrative materials. Materials of these kinds are now fairly commonly kept in libraries, or in departments where students can study there even during short periods between timetabled activities. A limitation on their widespread introduction is that they take considerable time to devise and to test with a pilot population. For this reason some teachers are working in cooperative teams. For instance, chemists mainly from the London area are writing programmed texts in inorganic and organic chemistry which are commented on by other team members and piloted amongst the students of their various university departments and colleges.

An arrangement more suitable in a single department is to second a member of staff to a Unit where such activities are undertaken, or to reduce his commitments whilst he develops the new technique with advice from experts in educational technology. The BMA and the medical school at Birmingham each employ an educational technologist to prepare programmes for use by individual students, but this is a solution too expensive to be considered by any but large departments or organisations. Rapid development of these methods, therefore, depends on finance for cooperative schemes.

The UGC Committee set up to assign funds for promotion of educational development would have favoured jointly planned projects leading to results useful in a number of institutions; but unfortunately owing to the financial crisis the reserve was redirected to more urgent needs.

4. Organising Postgraduate Supervision and Studies

A further problem which has been mentioned increasingly during the last few years concerns postgraduate studies. The most frequent criticism is that postgraduate research tends to be too narrow to give a sound education in research methods. On their part, some postgraduate students have expressed concern about limitations which they feel are imposed on them if they have only one supervisor; inevitably they fear to offend him by disagreeing with his views (Hargreaves, 1973). They would like the freedom, which some students already have, to consult other tutors, since this ensures that there is someone to turn to if the supervisor is absent or proves uninterested.

Some young university teachers at a conference in London shared this concern, possibly because they felt that several tutors would be wiser than one, in assisting students with the variety of problems they meet. They were also critical of the appointment of only one external examiner, since they felt that this led to unevenness in standards; some older teachers too commented on astonishing differences in standards amongst supervisors in the same school or department. They therefore favoured the appointment of two external examiners, or public vivas of PhD students similar to those held in some continental countries. But these are matters for universities to decide rather than teachers of individual departments, and most universities have regulations which allow observers at vivas, although the opportunity is rarely taken.

However, each university department can play an effective role in providing a broadly based postgraduate education. Two rather different approaches met with the approval of the conference members. In the first of these, students choose a supervisor but may consult any tutors as they wish and, due to a reciprocal arrangement with a department in another college, they may choose topics outside the range of interests of teachers in their own department. Thus there is wide choice and the possibility of interdisciplinary investigations. A postgraduate room is provided where students can keep papers and engage in discussion with

fellow students. Exercises are set, such as a literature search, analysis of data, repetition of a small study or part of a larger one to gain insight into the suitability of methods employed and the validity of conclusions. Students lead seminars on topics of their choice. In these ways they acquire a wide range of research skills, and hear discussions of a diversity of topics, before deciding on the subject of their own research and its treatment.

The second method, more favoured in the United States and in departments of management in Britain, requires a more detailed analysis of skills in research and development of exercises to teach each one. This therefore involves a 'task analysis', as described by educational technologists, and a carefully devised programme of exercises to ensure acquisition of essential skills - possibly for each student, since different areas of study may require somewhat different skills. Student seminars, and American style vivas in which research proposals are discussed, also play a part in this approach. Since the supervisor is responsible for ensuring that his student successfully undertakes these exercises, it is customary to credit him with one hour's teaching time per week for each post-graduate student.

5. Departmental Decisions and Organisation Relating to Undergraduate Teaching Methods

Most teachers do not immediately appreciate that changes in teaching methods may affect departmental organisation. Nevertheless, a few illustrative examples serve to show that this can be the case. In departments (usually in large universities) where students spend a considerable time following individual programmes, for instance, the Keller Plan (Elton, Bond, Nuttall & Stace, 1973) or other schemes based on the method devised by Postlethwaite and colleges (Postlethwaite, Novak & Murray, 1964), teachers are likely to spend less time lecturing, but may give more time to discussion with individuals. Space is needed for individual study, but fewer lecture rooms are required. In departments where undergraduate degrees can be obtained through research, more laboratory space may be needed and the teachers' tutorial role is accentuated in comparison with their role as

lecturers. If the number of lectures is reduced due to the evidence that lectures are as good as other methods only in imparting information, but not to stimulate thinking or to modify attitudes (Bligh, 1971b), there may be a demand for more small rooms suitable for group discussion.

Since decisions to modify rooms for new uses, to employ educational technologists and technicians, to prepare individual teaching aids, or to supply more teachers, tend to be costly, knowledge of a variety of ways of achieving the same end and evidence concerning their relative effectiveness is highly desirable.

It is usually assumed, for instance, that increased use of group discussion requires the use of a large number of tutors and small rooms. But, with a class of up to one hundred or one hundred and fifty, it is possible for a single lecturer to organise discussion in groups, each having nine or ten members (Mosel, 1964; Bligh, 1973). This method has the advantage that the same person plans both the initial lecture and the activity to follow; students play a more active role, since few are inhibited by a student leader; and the teacher can circulate to join in discussion, incidentally obtaining an impression of the students' level of understanding of the subject he has taught. Numerous other ways for a single teacher to organise discussion are outlined by Bligh (1971a) who also suggests ways of initiating it and of maintaining interest. Since this may involve teachers in playing a rather different role from that to which they are accustomed, training in group techniques is desirable. Indeed, students' complaints and the constantly growing demands for skill in presenting new material in new ways makes it imperative that all teachers should be urged to take an interest in teaching methods and to attend courses in which they can improve their skills in communication.

Decisions and Organisational Changes

Recommendation 1

Every department should make provision for students to receive information about the aims of their courses. This should exceed the list of topics, usually provided in syllabuses, by explaining what are the main aims or, since this may be another way of saying the same thing, what it is that teachers look for in assessing performance. Where alternative interpretations of the subject exist, students should be forewarned, and each should be expounded, where possible by an advocate.

Recommendation 2

The assessment system should be reconsidered from time to time in the light of changing course aims. A scheme relating aims, teaching methods or learning activities and assessment should be prepared for circulation to students.

Recommendation 3

Where aims, limitation of resources, or students' needs indicate this, modern individual methods should be introduced or developed. This may involve secondment of a member of staff, temporary appointment of an educational technologist, or cooperation with teachers in other universities, colleges or departments.

Recommendation 4

Methods of educating postgraduate students should be overhauled. This may involve:

(i) providing a room for the use of postgraduate students

(ii) arranging seminars which they lead

(iii) cooperating with neighbouring colleges or departments to allow greater range in choice of research topics

(iv) allowing students to choose a number of tutors in addition to having a supervisor

(v) encouraging staff to exercise their right to attend vivas of Masters and PhD degree students who they have not tutored.

Recommendation 5

Teachers should be encouraged to develop greater skill in teaching by attending courses where these are discussed and/or practised.

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